Project Management in the Metallurgical Industry

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The Past

In the past, large metallurgical companies (for example the mining houses) had the necessary infrastructure both to develop metallurgical flowsheets and to undertake the construction and project management of metallurgical plants. Effectively, the sole contribution by contracting companies was the supply, and possibly the installation, of specific items of equipment. This is perhaps a logical approach in a rapidly developing country, in which the mining and metallurgical industry had largely to be technically self-sufficient. It has applied especially in those areas where a number of similar plants were required by a mining house, and where the required expertise was already present within the mining industry. Thus, for example, in the metallurgical processing of Witwatersrand gold and uranium ores, the technical skill was initially focused more on flowsheet development than on the design of specific unit operations. Therefore, local engineering contracting companies, who were small and often had to rely on technical infrastructure that had been developed overseas, could make only a limited contribution.

Exceptions to this broad generalization occurred in the early sixties, when some of the mining houses entered the fields of iron and steel by non-conventional routes and by the production of ferro-alloys. Engineering contracting firms (with expertise that was sometimes directly related to processing operations overseas) had a major responsibility in the design and erection of such plants, even though the pilot-plant work was undertaken locally.

The Present

More recently, several additional aspects have entered the picture.

(1) There is now a greater shortage of trained engineering manpower than previously, and this makes it difficult for each metallurgical company to have, in addition to its operating staff, the required technical infrastructure for the design, construction, and contract management of plants.

(2) The high capital costs and interest rates make it imperative that construction should be as rapid as possible, preferably with a guaranteed completion date.

(3) Several unit operations, even in the gold and uranium industry, have become more complex. Examples include continuous countercurrent on exchange for absorption and elution in uranium circuits; and carbon-in-pulp contactors, elution columns, regeneration kilns, and electrowinning cells in carbon-in-pulp circuits. In such cases, several mining companies have relied on the combined skills of research organizations, the engineering contractor, and their own in-house expertise.

(4) Several local contracting companies have developed their technical infra structure to such an extent that, in certain areas it is as good as, or better than, that within some companies in the metallurgical industry. It is suggested that several or all of these aspects are responsible for the increasing use of engineering contracting companies by the local metallurgical industry. One can visualize that this gradual evolution has required considerable adjustments.

Examples of Adjustments

(a) One presumes that, because of the human factor, a plant that has been constructed by the mining and metallurgical company itself is easier to commission, and faults can be attended to directly by in-house staff who have gained experience during the construction phase.

(b) The use of engineering contracting companies does not eliminate a contribution from the mining and metallurgical company. The latter must still have a small but highly competent engineering staff to undertake the conceptual design phase, to interact with the contracting company, and to transfer the new plant to the operating staff.

(c) The client has still to analyse the technology that is purchased and the results of research-and-development work that is undertaken in-house or at statutory research-and-development organizations, and this information must be modified and adapted before it can be transferred to the contracting company. Perhaps independent metallurgical consultants or the contracting companies themselves will at some future date have the research-and-development work undertaken as part of their overall management contract with the client. Such practice, for example, appears to be fairly common in the United States of America.

(d) Not only has the technical interaction between the engineering contracting company and the metallurgical company undergone change, but the administrative and legal aspects of the contract are also likely to have changed. In the context of guarantees for process and equipment, the impression is sometimes gained that the legal responsibilities are not much more rigorous than the moral and ethical principles involved, apart from the fact that the success of a tender depends ultimately on the past performance of the contracting company.

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OBITUARY: AUSTIN WHILLIER (1927 - 1981)

On Thursday, 13th August, 1981, Dr. Austin Whillier passed away peacefully in Johannesburg after a long illness. This event has been a serious blow indeed, and its effects will be felt, not only by the Chamber of Mines of South Africa and the South African mining industry, but also throughout many scientific and technical spheres both in South Africa and further afield.

Austin Whillier was born in Vrede, in the Orange Free State, in 1927, grew up in Germiston, and matriculated at the Johannesburg Technical High and Trade School (now the John Orr Technical High School). His undergraduate academic training was at the University of the Witwatersrand, where, in addition to obtaining the B.Sc. degree in Mechanical Engineering *cum laude* in 1947, and receiving the Bernard Price Prize as top student in his class, he was active in student affairs and sport.

After a short period with the South African Council for Scientific and Industrial Research in Pretoria, during which he was involved in investigations into unsteady-state heat transfer in buildings, Austin left to take up a Union of South Africa Post-graduate Scholarship at the Massachusettes Institute of Technology. This period at M.I.T. saw the attaining of more, and greater, achievements in the form of two higher degrees, Master of Science and Doctor of Science in mechanical engineering, as well as the Karl Taylor Compton prize for 1953 as the student who contributed 'most to university life while maintaining a high academic standard'.

The content of his doctoral thesis, on the subject of solar energy, was so enlightened and so sound that it is still considered to be highly relevant today — so much so, in fact, that it was recently published in book form. His

association with M.I.T. continued for a further year and a half after he obtained his doctorate, in the capacities of lecturer and research associate, and the teaching activities of this period provided the roots for Austin Whillier's outstanding ability as a teacher. Over the years since then, many a class at many a level has benefited from his patience and understanding in the lecture theatre.

Leaving M.I.T. at the beginning of 1955 Austin rejoined the CSIR in Pretoria, where he served, first, as head of the Refrigeration and Air Conditioning Division of the National Mechanical Engineering Research Institute and, subsequently, as the first head of the Hydromechanics Division, being responsible for building up the newly-informed Division.

In mid 1961, the overseas academic world called once again, and Austin took up an appointment as Associate Professor at McGill University with the responsibility of getting going the newly-established experimental station located in Barbados, West Indies, which was engaged in the development of equipment to utilize solar and wind energy.

His return to South Africa at the beginning of 1965 brought him back to the academic world, as Senior Lecturer in the Department of Mechanical Engineering at the University of the Witwatersrand. Formal involvement with the University in this capacity was short, lasting only for the year 1965, but, subsequent to his leaving to join the staff of the Research Organisation of the Chamber of Mines of South Africa, the University and many of its classes continued to benefit from Austin's services, either as an external lecturer in the Department of Mining Engineering, or as an external examiner to the School of Mechanical Engineering.

In the course of his sixteen years with the Chamber of Mines, Austin rose to be Director of the Environmental Engineering Laboratory, and throughout brought his brilliant analytical mind to bear on the problems encountered in the cooling and ventilating of deep and hot mines. In both these areas, and in the various aspects they encompass, great strides were made by Austin and his team. In particular, the new method of cooling mines that was formulated, and has proved so successful that it is being adopted increasingly by South African mines, must be singled out as an outstanding achievement, an invaluable asset to the mining industry worldwide, and a fitting monument to Austin's ability.

In recognition of this achievement in the field of cooling of mines, Austin was awarded the National Award of the Associated Scientific and Technical Societies in 1977. Other important awards and honours that came to him in recent years include the silver medal of the South African Institution of Mechanical Engineers in 1968 and the gold medal of the Mine Ventilation Society of South Africa, as co-winner, 1973. In addition, close on a hundred papers have appeared in the technical press, bearing the name of Austin Whillier either as author or co-author, and covering a very wide range of subjects.

Austin Whillier's contributions to progress in technical and scientific spheres have not been limited to those which arose in his normal line of duty, and his years of hard work for various technical and scientific bodies bear witness to this. He was Past-President of the Mine Ventilation Society of South Africa, The South African Institution of Mechanical Engineers, The Associated Scientific and Technical Societies of South Africa, and the Solar Energy Society of Southern Africa.

The untimely passing of Austin Whillier is indeed a tragic loss that will be felt widely now and in the future. He is survived by his wife Mary, daughter Muffy, and sons John and Stephen; to them we all offer our deepest sympathy.

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Technical Infrastructure

Finally, although the metallurgical and mining industry can increasingly rely on engineering contracting companies to undertake a larger proportion of the design and construction of plants than in the past, the technical infrastructure of the client has to remain high. This is to ensure that modifications to flowsheets and unit operations on existing plants, particularly for improved control and optimization, are made as the technology improves. Therefore, technical expertise has to remain high in both parties, and the shortage of engineers will remain a problem for both.